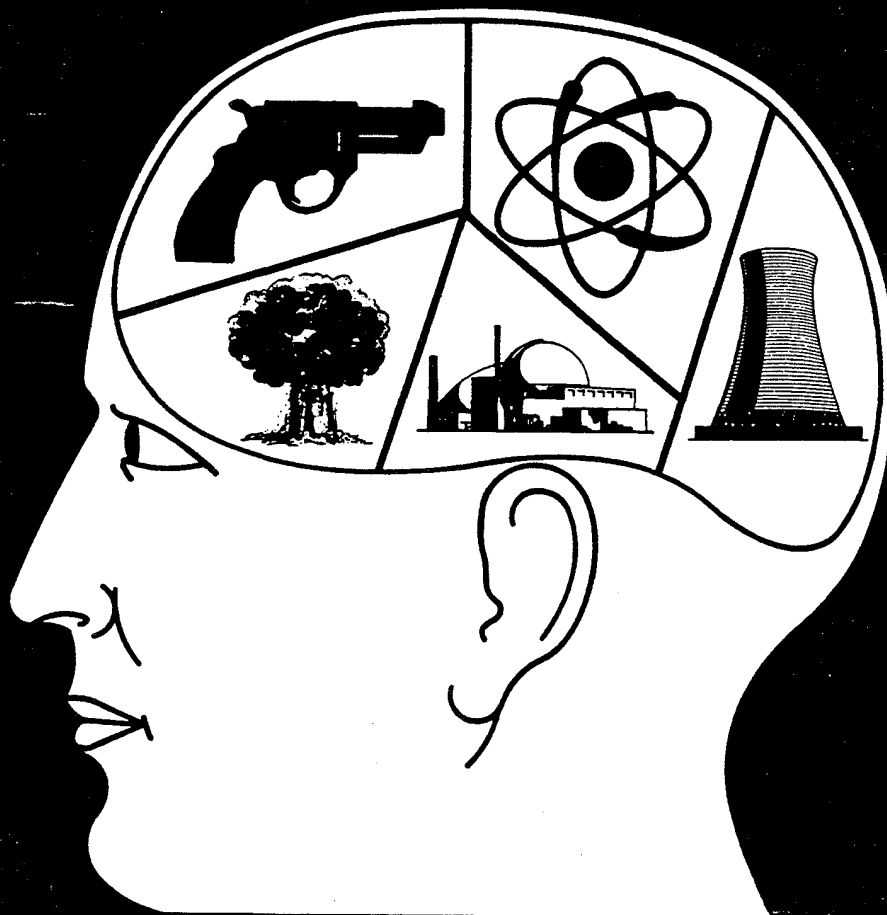


# Motivations and Possible Actions of Potential Criminal Adversaries of U.S. Nuclear Programs: Executive Summary

Gail Bass, Brian Jenkins, Konrad Kellen, Joseph Krofcheck,  
Geraldine Petty, Robert Reinstedt, David Ronfeldt

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February 1980



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## PREFACE

The research reported here was sponsored by Sandia Laboratories and represents the second phase of a continuing project on the potential threat to U.S. nuclear programs. An earlier Rand report identified possible resources and operational capabilities of potential adversaries: R-2225-SL, *Attributes of Potential Criminal Adversaries of U.S. Nuclear Programs*, by P. DeLeon, B. Jenkins, K. Kellen, and J. Krofcheck, February 1978. The present report focuses on adversary motivations. Future research will examine the relative likelihood of different types of nuclear-related crimes and attempt to determine the relative attractiveness of different types of nuclear targets to various potential adversaries.

This is an Executive Summary of the full report, available as R-2554-SL, *Motivations and Possible Actions of Potential Criminal Adversaries of U.S. Nuclear Programs*, February 1980.



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## I. INTRODUCTION

This report summarizes the findings of a study of the motivations and intentions of potential criminal adversaries of U.S. nuclear programs and facilities.<sup>1</sup> The study was based on two premises. The first is that if we understand motivations, we can infer the actions and targets that an adversary is likely to prefer. The second is that given such inferences, and linking them to information about the material and operational capabilities of various types of adversaries, those responsible for nuclear security will be better able to assess the potential threat to nuclear programs and to devise more effective systems for deterring and defending against nuclear crimes.

We use the term "nuclear programs and facilities" in its broadest sense, to include weapon fabrication facilities, civilian nuclear energy facilities and facilities in the fuel cycle, nuclear research facilities, facilities that fabricate fuel for naval reactors, and all related transport of nuclear material. The term "nuclear crime" refers to a malevolent criminal action against a nuclear target or involving nuclear material or weapons. We exclude from this category legitimate acts of protest and even minor delinquencies such as trespassing when these are not part of some more serious action. We are most concerned with crimes that may cause significant damage or disruption, and especially with those crimes that may directly or indirectly imperil public safety. We include among these attack, seizure, or sabotage of a nuclear facility; threats against nuclear facility personnel or their kidnapping or assassination; theft or diversion of nuclear material; release of radioactive materials; theft or detonation of a nuclear weapon; construction of an improvised nuclear device; and extortion involving nuclear materials or weapons.

The remainder of this section describes the study's approach to the problem and offers a simple typology of motivations. Section II presents a matrix that links specific motivations with the actions they might inspire and flags types of actions that have already occurred. Section III reviews the study's major conclusions.

## METHODOLOGY

An earlier Rand report described the material and operational capabilities that various categories of adversaries are likely to possess.<sup>2</sup> Because there have been few attacks to date against U.S. or foreign nuclear programs, the earlier study relied primarily on an analog approach, drawing inferences about potential nuclear adversaries by analyzing a data base of recorded analogous crimes (such as task force crimes, terrorist assaults, industrial sabotage, and symbolic bombings).

The methodology of the present study is complementary to that of the earlier study. We are concerned here with the *why* of behavior (motivations) rather than

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<sup>1</sup>The table of contents of the parent report, R-2554-SL, appears in the appendix to the present report to give the interested reader a detailed view of the subjects covered in the study.

<sup>2</sup>P. DeLeon, B. Jenkins, K. Kellen, and J. Krofcheck, *Attributes of Potential Criminal Adversaries of U.S. Nuclear Programs*, The Rand Corporation, R-2225-SL, February 1978.

the *what* (weapons, tactics, techniques); hence the report contains less empirical evidence and the analytic process is necessarily more speculative. The findings are the product of four interrelated lines of inquiry: a structural approach, a psychological approach, an analog approach, and an examination of past nuclear incidents.

In the structural approach, we posit the most likely combinations of perpetrators, motivations, and intentions, and then identify those actions that would be congruous. For example, a disgruntled employee (whose motivation we would label 'personal') might want to inflict economic damage on his employer, perhaps by temporarily disabling a plant, disrupting operations, or damaging equipment through such actions as vandalism, sabotage, and hoax bomb threats against the facility. People with economic motives would be more likely to engage in theft of material or various extortion schemes involving threats to personnel or facilities.

The structural approach does not attempt to penetrate deeply into the mind of the perpetrator and, in a sense, contains an element of tautology. Thieves steal. Terrorists terrorize. Nonetheless, it is useful for identifying likely combinations of perpetrators and actions, and ultimately, of capabilities and targets.

In the psychological approach, we attempt to penetrate the mind-set of the adversary more deeply than we do in the structural approach, although we do not delve into unconscious motivations. By examining the communiques and manifestos of terrorist groups, the biographies and autobiographies of terrorists, and the various theories of terrorist behavior, we have gained some insights into the conscious motivations and intentions of terrorist groups as they pertain to the nuclear domain. Similarly, the literature on the criminal mind and criminal behavior yields some clues to the motivations of the potential nuclear adversary.

The third line of inquiry, the analog methodology used in our earlier study of adversary resources, capabilities and methods, is extended here to examine the motivations and intentions of possible adversaries by considering various categories of criminals whose actions are in some way analogous to possible nuclear crimes, including sophisticated burglars, arsonists, mass murderers, and psychotic bombers. The assumption is that those who might be prompted to undertake analogous nuclear crimes (such as theft of special nuclear material (SNM), or mass contamination by radioactivity) would have similar motivational patterns.

Lastly, although few serious criminal actions involving nuclear facilities or material have occurred, there has been a large number of incidents of vandalism, minor sabotage, theft, and symbolic acts of violence at nuclear facilities. Numerous threats to bomb nuclear facilities or to use nuclear devices have been made. These incidents cover a spectrum of motivations, including economic, political, antinuclear, and environmental concerns, and psychosis. Such incidents free us from relying entirely on posited motives or on analogs. Our fourth line of inquiry, then, was to examine all such nuclear incidents for motivation, and compare our conclusions with those produced by the other lines of inquiry.

A note of caution is in order. For much of the analysis, we examined criminal actions in our data base to infer the motivations that might have stimulated them. Because motivations are not directly observable, these inferential leaps are inherently somewhat problematic. Further uncertainty arises when we extend our inferences to the realm of nuclear adversaries, because our data base consists mostly of nonnuclear incidents. Nuclear crimes might be qualitatively distinct from the data in hand. However, our methodological assumption is that the inferential process

followed here, judiciously applied, allows us to offer much more plausible conclusions than would be possible if we had to depend exclusively on hypothetical scenarios.

## **MOTIVATIONS OF POTENTIAL ANTINUCLEAR ADVERSARIES**

The motivations that might impel people to undertake criminal actions against U.S. nuclear programs can be roughly divided into three categories: ideological, economic, and personal. Ideological motivations are those linked to a political or philosophical belief system. They would include those of political terrorists, antinuclear extremists, and certain groups of philosophical or religious fanatics. Such adversaries might fix on nuclear facilities as a target in hopes of influencing government (or industry) policy on nuclear energy or nuclear weapons; as a way of coercing changes in other (nonnuclear) areas of government policy; as a way of undermining public confidence in the government and promoting political unrest; or as part of a plan to impose their idiosyncratic philosophical or religious perspective on society at large. Economic motivations involve a desire for financial gain. Both professional and amateur criminals might envision a dazzling bonanza in seizing nuclear material or weapons for ransom, sale, or extortion. Personal motivations emerge from the special situations of specific individuals. Personal reasons for committing an antinuclear crime would range from those of the hostile employee seeking to redress a grievance against his employer to those of the psychotic who obeys the commands of imaginary celestial voices.<sup>3</sup>

This three-way categorization of motivations is merely an expository convenience, of course. Some adversaries may resist being so neatly pigeonholed because they have multiple motivations. For example, a group of political terrorists might see the theft and ransom of nuclear material as a way to advance both ideological goals and their finances. Or a disgruntled nuclear industry employee might accept a bribe to furnish a criminal group with information about plant security procedures, thereby gaining both vengeance and money.

The three types of primary motivations we have described—ideological, economic, and personal—generally operate at the conscious level. They correspond to the reasons an adversary could cite for undertaking an action. Subtler and possibly unconscious motivations will also be at work, of course, in both individuals and groups. Hostility to authority, or the thrill of taking risks and engaging in violence, may be a powerful stimulus for some people. Self-aggrandizement may be another, because of the extraordinary publicity likely to attend any daring nuclear crime. At the group level, political terrorists may be prodded to act by the pressures of living at close quarters underground, combined with the need to maintain morale and dedication at a high pitch through action, whether against nuclear or other targets.

While we recognize the importance of these subsidiary motivations, the major part of our analysis has addressed the three categories of primary motivations: ideological, economic, and personal.

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<sup>3</sup>We recognize that financial gain can also be considered a "personal" motivation. We have chosen, however, to treat it separately and to reserve the term "personal motivation" for the broad collection of idiosyncratic motive forces.

## II. A MATRIX OF ADVERSARIES, MOTIVATIONS, AND POSSIBLE ACTIONS

This section presents a matrix linking the categories of potential adversaries with nuclear-related crimes that appear congruous with their motivations and therefore are plausible. The matrix does not pretend, however, to assess the relative probabilities of occurrence of any of these crimes, nor does it predict that any of them will in fact occur. Statements about relative probabilities must await completion of the next step in our research: a synthesis of this study's analysis of motivations with analyses of adversary attributes and capabilities.

The nuclear-related crimes covered in the matrix are divided into two broad categories: those that directly involve the security of U.S. nuclear facilities or programs and those that do not. The latter would include, for example, nuclear extortion threats or dispersal of nuclear material not necessarily obtained from a U.S. facility. We have included these because the response to such nuclear threats or actions could involve U.S. nuclear security officials and make special demands on security and safeguard systems. We further subdivide actions directly threatening U.S. nuclear facilities or programs into three categories, depending upon whether the basic intention is to (1) destroy or disable a nuclear facility, (2) acquire nuclear materials, weapons, or classified information, or (3) cause disruption to nuclear programs—either in service of some other goal, such as extortion or coercion—or as an end in itself.

The adversary types in the matrix are grouped according to their primary motivations, corresponding to the three-part division discussed earlier: economic, ideological, and personal motivations. A fourth category, "in service of foreign governments," is also included. Mercenaries, foreign agents, and foreign commandos fall into this category.

The matrix is intended to cover the full range of potential nuclear-related crimes as well as the full range of motivations and adversary types. We recognize, of course, the possibility of multiple motivations (for example, an adversary with both economic and personal motives) as well as of composite actions involving more than one of the nuclear-related crimes listed in the matrix.

In deciding which adversaries would be likely to contemplate particular actions, we based our judgments on the present political and social environment. We realize, however, that changing circumstances could alter the types of actions a given adversary might be willing to attempt. For example, the use or threatened use of nuclear capabilities by terrorists elsewhere in the world, the emergence of a black market in SNM, the increased polarization of pronuclear and antinuclear elements in society, general political or social unrest, or the occurrence of a serious nuclear accident could alter the attractiveness of certain crimes to various potential adversaries.

A question mark appears after several of the entries in the matrix to indicate

uncertainty as to whether that particular action would in fact be congruous with that adversary's motivations and intentions.

The matrix is followed by a discussion of which types of actions have already occurred in the nuclear domain. In the matrix itself, solid bullets flag crimes that have already been committed in the United States or abroad; hollow bullets flag those that may have been committed but for which the evidence is inconclusive.

## CRIMES THAT HAVE OCCURRED

With regard to professional criminals, we know of no threats to destroy or disable nuclear facilities or disrupt nuclear programs, and no thefts of SNM. There is, however, at least one known theft of uranium ore by employees who, although perhaps not professional criminals strictly speaking, did have criminal records. Similarly, occasional or novice criminals or opportunists have not, as far as we know, threatened destruction or disruption for purposes of extortion, but numerous minor incidents of theft at nuclear facilities have been reported. Some were clearly the work of insiders, such as the theft of fuel rods from a reactor in England in 1966 and the theft of uranium from a plant in India in 1974. Others clearly were break-ins. None entailed the use of firearms. None involved SNM. Although we know of no incidents involving the misuse of nuclear facilities, there was one reported case of a substantial bribe offered to a Texas firm to process uranium secretly. Also, an illicit offer to sell nuclear material was made to a U.S. firm in 1978. There have been several such cases. Finally, some of the nuclear threats appear to be the work of amateur extortionists.

Political terrorists have claimed credit for token bombings (categorized as low-level sabotage) at nuclear facilities in the United States and Europe. Breton and Basque separatists have claimed credit for more serious acts of sabotage in France and Spain. None involved the release of radioactive materials. There have been no reported attempts by terrorist groups to steal nuclear material or weapons; however, interviews with two ex-members of West German terrorist groups suggest that such action has been at least contemplated. Terrorists in Spain have kidnapped officials of nuclear facilities for the purpose of interrogating them and taking their keys to place bombs in their offices. The same terrorist group has threatened prominent officials in the nuclear industry with assassination if the planned nuclear programs are pursued. Terrorists in West Germany have placed bombs at the homes of those charged with the security of nuclear facilities. Argentina provides the only incident in which a nuclear facility (at the time still under construction and unfueled) was briefly taken over by terrorists. There have been armed assaults on nuclear facilities in Spain and armed terrorists recently broke into a nuclear facility in Italy.

Antinuclear extremists have claimed responsibility for bombings at nuclear facilities and other incidents of low-level sabotage in Switzerland, Sweden, France, and the United States. Some of the antinuclear demonstrations in Europe have been violent, with planned mass assaults by demonstrators. Demonstrators opposed to nuclear programs in the United States have not gone beyond trespassing. There are no known criminal actions against nuclear facilities by religious extremists.

# POSSIBLE NUCLEAR-RELATED CRIMES

Adversary	Possible Crimes Involving the Security of U.S. Nuclear Facilities or Programs			Crimes Not Involving the Security of U.S. Nuclear Facilities or Programs
	Destroy or Disable Nuclear Facilities	Acquire Nuclear Material or Information	Disrupt Nuclear Programs	
		<i>Economic Motivation</i>		
Professional criminals	Threaten or engage in sabotage in connection with extortion	<ul style="list-style-type: none"><li>Threat (all categories) by stealth or force<sup>a</sup></li></ul>	Threaten or engage in kidnapping or violence against persons in connection with extortion or coercion	Nuclear threats in connection with extortion or coercion Sale or attempted sale of nuclear material
Occasional or novice criminals or opportunists	Threaten or engage in sabotage in connection with extortion	<ul style="list-style-type: none"><li>Theft (all categories) not by force<sup>a</sup></li><li>Diversion</li><li>Theft of information</li><li>Misuse of facility</li></ul>	Threaten or engage in kidnapping or violence against persons in connection with extortion or coercion Fake a diversion for the purpose of extortion Disclose classified information	<ul style="list-style-type: none"><li>Nuclear threats in connection with extortion or coercion</li><li>Sale or attempted sale of nuclear material</li></ul>
<i>Ideological Motivation</i>				
Political terrorists	High-level standoff attack	Theft (all categories)	<ul style="list-style-type: none"><li>Threaten or engage in kidnapping or violence against persons</li></ul>	Nuclear threats in connection with extortion or coercion Detonation of nuclear device Dispersal of nuclear material Fabrication of nuclear device
Antinuclear extremists	Sabotage (all levels)	<ul style="list-style-type: none"><li>Seize and hold a facility with (or without) hostages</li></ul>		
	Low-level standoff attack	<ul style="list-style-type: none"><li>Trespass</li></ul>		Nuclear threats
Philosophical or religious extremists	Low-level sabotage	<ul style="list-style-type: none"><li>Incite to illegal actions</li></ul>	<ul style="list-style-type: none"><li>Seize and hold a facility (with hostages (?)</li><li>Disclose classified information</li></ul>	
	High-level sabotage	<ul style="list-style-type: none"><li>Seize and hold a facility (with hostages (?)</li><li>Disclose classified information</li></ul>		
Philosophical or religious extremists	Sabotage with radioactive release	Theft of SNM or nuclear weapons	Incite to illegal actions Threaten or engage in kidnapping or violence against persons Disclose classified information	Nuclear threats in connection with extortion or coercion Detonation of nuclear device Dispersal of nuclear material Fabrication of nuclear device
<i>Personal Motivation</i>				
Psychotics	(No action can be eliminated from the range of psychotic behavior)			
Individuals acting for idiosyncratic reasons	Low-level standoff	Theft (all categories) not by force	<ul style="list-style-type: none"><li>Pranks, hoaxes, bomb threats</li></ul>	<ul style="list-style-type: none"><li>Nuclear threats in connection with extortion or coercion</li></ul>
	Low-level sabotage	Diversion	Fake a diversion Disclose classified information	Fabrication of nuclear device
Hostile employees	Low-level sabotage	Theft or purchase of information		
	High-level sabotage (?)	<ul style="list-style-type: none"><li>Theft of non-SNM or small quantities of SNM<sup>a</sup></li><li>Diversion</li><li>Theft of information</li></ul>	Incite to illegal actions Trespass Seize and hold a facility (with hostages (?)	Nuclear threats in connection with extortion or coercion
			<ul style="list-style-type: none"><li>Hoaxes</li><li>Threaten or engage in violence against persons</li><li>Disclose classified information</li></ul>	

In Service of Foreign Government			
Mercenaries, foreign agents, or foreign commandos	High-level standoff ○ High-level sabotage Sabotage with radioactive release	Theft (all categories) Diversion ● Theft or purchase of information Misuse of facility	Engage in kidnapping or violence against persons ● Disclose classified information
			Safe or attempted sale of nuclear material Detonation of nuclear device or dispersal of nuclear material Fabrication of nuclear device

NOTE: ● = occurred  
○ = may have occurred

aWe know of no proven thefts of SNM. The ● refers only to known theft of non-SNM.

#### TYPES OF ADVERSARIES

*Professional criminal:* crime is main source of livelihood.  
*Occasional or notice criminal:* may have criminal record but not a habitual offender.  
*Opportunistic:* takes advantage of opportunity for illegal gain; no prior criminal record.  
*Political terrorist:* member of group aiming for political change through violent attacks.  
*Antinuclear extremist:* commits illegal acts out of opposition to nuclear programs (for ecological, safety, political, or economic reasons).  
*Philosophical or religious extremist:* beliefs would condone or encourage acts of mass destruction.  
*Psychotic:* impaired personality or brain function; distorted view of reality.  
*Individual acting for idiosyncratic reasons:* not psychotic, but driven to take illegal actions to satisfy egocentric motivations (e.g., exhibitionism, megalomania).  
*Hostile employee:* nuclear industry employee motivated by specifically job-related grievances or labor-related conflict.  
*Mercenaries, foreign agents, and foreign commandos:* knowingly and willingly serve foreign government. Mercenaries may include professional criminals or terrorists; "foreign agents" implies insiders acting covertly; "foreign commandos" implies paramilitary operation mounted by foreign power, not necessarily using nationals of that power.

#### TYPES OF ACTIONS

*Theft (by stealth or force):* matrix distinguishes three categories:  
 Theft of non-SNM: e.g., equipment, conventional explosives, unenriched uranium.  
 Theft of SNM: special nuclear material in quantity too small to fabricate nuclear weapon.  
 Theft of SNM in strategic quantities: e.g., a nuclear weapon, a nuclear weapon component, or enriched nuclear material sufficient to fabricate weapon.  
*Diversion:* theft by insiders (or with insider assistance) designed to conceal loss by altering records.  
*Sabotage:* matrix distinguishes three levels:  
 Low-level: vandalism or action intended to temporarily disrupt operations or disable facility.  
 High-level: destruction of a facility involving danger to human lives.  
 Sabotage with radioactive release: destruction of a facility intended to create radioactive release, endangering public safety.  
*Kidnapping or violence against persons:* directed against nuclear industry officials or employees (or families) for coercion or intimidation.  
*Misuse of facility:* unauthorized use of nuclear facility (e.g., to process stolen material).  
*Standoff attack:* matrix distinguishes two levels:  
 Low-level: e.g., pistol or rifle fire directed against nuclear facilities or transport vehicles.  
 High-level: e.g., use of crew-served weapons (mortars or rocket-propelled grenade launchers), aerial bombing, or use of remotely piloted aircraft or vehicles carrying explosives.  
*Disclose classified information:* unauthorized disclosure of classified information by those with legal access, for financial gain, to aid adversaries, or to influence or incite public.  
*Fake a diversion:* create the appearance that nuclear material is missing by manipulating records, altering identity of containers, or concealing material within facility (for extortion, coercion, or disruption).



Mentally disturbed persons are known to be responsible for at least one incident of arson in the United States (a fire at the Indian Point nuclear reactor in 1971), and the theft and deliberate dispersal of radioactive material in Austria in 1974. Several incidents of low-level and high-level sabotage in France are suspected to be the work of a psychotic. Many of the nuclear threats clearly appear to be the expression of mentally disturbed persons.

A number of incidents of shots inexplicably fired at nuclear facilities, and of low-level sabotage, can be attributed to idiosyncratic behavior. Individuals have penetrated protected nuclear facilities or carried out other pranks simply to show that it could be done or to demonstrate that they could do it. Idiosyncratic behavior also explains a number of the bomb threats and nuclear hoaxes.

Although in most cases the perpetrators have never been identified, it is safe to say that hostile employees probably are culpable for some of the reported incidents of low-level sabotage, some of the thefts, and no doubt many of the bomb threats at nuclear facilities. Hostile employees are suspected of scattering plutonium pellets on the ground adjacent to a building where the material was processed.

In France, responsibility for the recent sabotage of reactor components bound for Iraq was claimed by a previously unknown antinuclear group calling itself the "Group of French Ecologists." Some press reports, however, have suggested that French environmentalists lack the technical sophistication to carry out such an operation, and that the sabotage was more likely committed by Israeli commandos to prevent Iraq from gaining a nuclear capability. Others have suggested that French authorities themselves, experiencing second thoughts about the sale of weapons-grade uranium to Iraq, contributed in some way to the sabotage. If the allegation regarding Israeli commandos is correct, the incident would provide the single example of high-level sabotage by foreign commandos. The hijacking of a ship carrying 200 tons of nuclear ore in 1968 also has been credited to Israeli commandos. If that attribution is correct, the incident is an example of theft of non-SNM by foreign commandos. There have been several cases of individuals charged with stealing information for delivery to foreign powers. And belated controversy arose in 1979 over the discovery that some 200 pounds of U-235 was unaccounted for during the 1960s at the NUMEC nuclear fuel processing plant in Pennsylvania. There was unconfirmed speculation that the material might have been diverted to Israel for use in bomb construction.

It is noteworthy how many of the actions postulated in the matrix have occurred (or have been revealed to have occurred) in the past ten years. Were this report being prepared a decade ago, a few minor thefts could be attributed to criminals, and a few incidents of low-level sabotage would be credited to people acting for personal reasons, most likely hostile employees. The range of actions that might be carried out by ideologically motivated individuals or groups would still be entirely theoretical. There would have been no nuclear hoaxes, no reported thefts of nuclear material, no reports of possible diversions, no violence on behalf of antinuclear causes, and no examples of any actions by ideologically motivated adversaries.

### III. CONCLUSIONS

This report has explored the motivations that might impel individuals or groups to undertake criminal actions against nuclear facilities or programs. The rationale for studying motivations is based on the premise that understanding *why* certain adversaries might want to attack nuclear targets may help us anticipate *what* they might attempt to do and *how*. Simply put, different motivations imply different preferred actions. We have made no judgments as yet about various adversaries' capabilities (e.g., personnel, training, equipment, dedication) to carry out their preferred actions. Once linked (in future research) to analyses of adversary capabilities, the information offered here on preferred actions may assist in delineating the types of potential threats that nuclear security systems must be prepared to defend against. Despite its inherently speculative qualities, this forward chain of reasoning—from motivations to possible actions—is essential in the nuclear domain because of our limited experience to date with actual nuclear crimes from which to infer future dangers.

Perhaps the overriding conclusion that emerges from this study is that nuclear defenders must anticipate a surprisingly wide range of threats from an equally wide array of potential adversaries who may be animated by ideological, economic, or personal motivations, or some combination of the three. The possible actions by these adversaries vary greatly in intensity from the adolescent prank to mass destruction.

Nuclear programs seem to have all of the adversaries faced by any large industry (e.g., disgruntled employees, environmentalists) as well as those faced by any industry that deals in a highly valuable commodity. Nuclear programs also attract some peculiar adversaries: opponents of nuclear energy and weapons development; political terrorists who view such programs as symbols of the political and economic system they wish to destroy; and emotionally unstable people obsessed by the almost mystical qualities of nuclear power.

The presumed range of potential dangers to nuclear programs is not entirely hypothetical. Although few nuclear crimes have occurred to date, those that have occurred in the United States and abroad provide examples of most of the categories of perpetrators, motives, and actions postulated in this report.

We have not attempted in this phase of our research to assess the probability that any of the actions described in the matrix will occur, beyond the simple observation that there have already been many low-level actions—bomb threats against nuclear facilities, low-level sabotage, nuclear hoaxes—that appear to have satisfied the aims of their perpetrators and therefore are likely to occur again. At least, the burden of proof would be on the opposite assertion. There is little basis for extrapolating from them to higher-level incidents, however. The next phase of our research will match motivations with the resources and capabilities that different categories of adversaries are likely to possess. That will provide a possible basis for assessing the comparative likelihood of various actions by any given adversary.

If we arrange the nuclear actions described in the matrix on a continuum according to the seriousness of the threat they pose to public safety, at one end

would be acts such as bomb threats, hoaxes, and token acts of violence, which may not be aimed at producing public casualties or violence, but which, if publicized, could cause disruption and alarm. At the other end would be such actions as high-level sabotage or the release of radioactive material, which could directly endanger the public. Only those adversaries driven by blind fanaticism or psychological abnormalities appear likely to attempt nuclear crimes aimed at producing widespread casualties.

In our previous report on the attributes of potential criminal adversaries of U.S. nuclear programs, we noted that "in the recent history of nuclear incidents, a faint escalatory trend may be discerned." This trend, in terms of both the number and the seriousness of incidents, appears to have continued since 1977, when the earlier report was completed. Part of this trend may be due simply to a more complete reporting of nuclear incidents, evidence that the security of nuclear facilities has become a subject of increasing public concern. Part of it is also due to recent revelations about incidents that occurred years ago. The 1970s also saw intensive investigations by federal law enforcement agencies of the circumstances surrounding nuclear material unaccounted for at NUMEC in the 1960s. The net effect of such belated revelations is to create the impression that malevolent activity is more common in the nuclear domain than was previously thought.

The perception of a trend has a basis in reality, however. Although we have not seen acts of sabotage deliberately aimed at causing radioactive release, a number of incidents have occurred since 1977 in which adversaries have demonstrated greater sophistication or greater willingness to cause casualties. To be sure, most of them have occurred outside of the United States. In 1978, for example, Basque terrorists in Spain detonated a large bomb at a nuclear facility under construction, killing four and wounding 14 persons. Another bomb at the same site in 1979 killed one worker. These were the first incidents of nuclear-related terrorist sabotage to have caused casualties. Also in 1979, unidentified saboteurs destroyed the critical components in two reactors built in France for sale to Iraq. The past year in Europe also saw the use of nuclear material in an attempted suicide.

We have not seen in the United States the separatist problems or the active terrorist groups to be found in Europe, nor have we seen the violent opposition to nuclear energy programs experienced in some European countries. We have seen an increasing number of nuclear hoaxes in the 1970s, most of them puerile threats, as well as several malevolent incidents, including the sabotage of nuclear fuel rods at a nuclear facility in Virginia and a bizarre plot to steal a nuclear submarine armed with nuclear weapons.

In sum, many possible criminal actions that had not yet occurred several years ago, or were not known to have occurred, have since occurred or been revealed. The spectrum of postulated nuclear actions, except for the higher-order threats, has become less and less hypothetical.

We normally think of seriousness in terms of the threat posed to public safety. We recognize, however, that owing to popular conceptions and misconceptions of nuclear energy, an incident of relatively harmless actual consequence conceivably could produce large-scale effects. For example, a well-formulated hoax nuclear threat might conceivably cause spontaneous evacuation, panic, looting, and other disorders that would threaten public safety. (As technical information about nuclear subjects becomes increasingly available to the public, and if there is a greater

incidence of nuclear material reported missing or unaccounted for, we might expect to see both a greater number of nuclear threats and threat messages that appear, at least on the surface, to be more credible.) This magnification of an incident or threat is possible because there is no accepted measure of the potential danger inherent in the event. Even the experts disagree on highly technical points. The fear invoked by the word "nuclear" in the minds of many people may provide a special attraction to certain categories of adversaries, and coping with this phenomenon legitimately falls within broader security concerns.

This report has examined three categories of potential adversaries: those who might be driven by ideological motives, economic motives, or personal motives. We have also considered the special problem of crimes by nuclear industry employees. The following paragraphs summarize our conclusions regarding each of these types of adversaries.

Political terrorists constitute one major category of ideologically motivated adversaries. From the standpoint of motivations and intentions, we foresee the possibility of two types of terrorist actions. First, and more likely, are actions intended to appeal to opponents of civilian or military nuclear programs, whom the terrorists may regard as a potential constituency. Such actions might include threats against or sabotage of civilian nuclear facilities under construction or in operation; threats or actions against executives or security officials at nuclear facilities, in the latter case particularly where there may have been violent confrontations between antinuclear demonstrators and police or security personnel; operations on behalf of persons jailed for antinuclear activities; and armed occupations, thefts, or other actions calculated to demonstrate the danger of nuclear programs or the inadequacy of security measures. Second, we are liable to see coercive actions in the nuclear domain intended to cause widespread alarm and increase the leverage of a terrorist group making demands on government. These actions might involve theft of a nuclear weapon or SNM for threatened use in an explosive or dispersal device, or the fabrication of a credible hoax threat.

As to the much-discussed possibility that terrorists might actually employ a nuclear capability to wreak massive destruction, there is a consensus among those who study terrorism that the apparent moral and political constraints that limit large-scale, indiscriminate acts of terrorism still apply. However, there is an accompanying consensus that the conventional terrorist tactics used thus far—bombings, assassinations, kidnappings, hijackings—may be losing their effectiveness. The coercion achieved through such tactics has been declining since the mid-1970s as governments have become more resistant to meeting the demands of terrorists. The publicity value of these actions has also declined through their having become commonplace in the last decade. Like the losing side in a war, terrorists might feel an irresistible urge to escalate all the way up to the "nuclear option." The brutalizing effect of their own continued violence, the losses they have suffered, their perception that the police and military apparatus of the state have been unleashed against them, or possible growing cynicism regarding "the people" on whose behalf they claim to fight, could erode the constraints against larger-scale violence, perhaps even allowing nuclear action to be seriously contemplated. However, such action would represent a quantum leap in the application of violence even by those we call terrorists.

Such a development would be more likely among the most fanatical and violent

terrorist groups (e.g., the Japanese Red Army), those with more millennial aims as opposed to a concrete political program. To date, domestic terrorist groups that have operated in the United States in recent years have not exhibited the millennialist tendencies that would suggest a willingness to consider an act of nuclear destruction as a serious option. However, we cannot exclude the possibility that some terrorist group active in another part of the world might attempt such an action in the United States, to extract foreign policy concessions or to punish the United States for past actions, or attempt to steal nuclear material from a U.S. facility to be used in a nuclear scheme in another country.

Antinuclear extremists represent a second ideological source of potential adversaries. Under some circumstances, such persons might be prompted to commit crimes against nuclear programs. One type of action might attempt to interfere with facility operations directly, as through bombings, arson, other forms of sabotage, or violent attack. Damage to the nuclear plant—and presumably the cessation of alleged dangers to health, safety, and the environment—would be the primary intended goal, with negative publicity for nuclear programs a desired secondary goal.

An alternative type of action might be an attempt to demonstrate the alleged vulnerability of the nuclear industry's security and safeguards systems. For example, antinuclear extremists might try to steal a nuclear weapon, divert nuclear material from a reactor facility, hijack a shipment of nuclear material, improvise a nuclear device, or penetrate and take over a reactor control room solely to demonstrate that such things could be done by more malevolent adversaries. An incident might be designed both for propaganda value—using media coverage to win converts to the antinuclear position—and to attempt to force the government or industry to upgrade security measures or halt nuclear activities.

In either type of action, we would expect most antinuclear extremists to attempt to avoid human casualties.

Despite the nonviolent history of antinuclear demonstrations in the United States, the possibility remains that radical groups or unstable people might join future demonstrations and attempt to foment violence. It is also conceivable that a terrorist group (repeating a tactic already employed elsewhere in the world) would try to incite a massive violent confrontation with police and security guards during a demonstration, in order to penetrate and sabotage the facility during the ensuing chaos.

A secondary effect of a violent demonstration, perhaps more significant than the chances of immediate damage to a facility, is that confrontation with police, injuries, and arrests could have a radicalizing influence on some demonstrators or their sympathizers, making them more likely to engage in future criminal actions.

The antinuclear movement is still so new that it is difficult to predict its future course, but the movement appears to be expanding, to judge from the growing numbers of demonstrators attending protest rallies and the proliferation of local groups opposing specific facilities.

Continued escalation in the public controversy surrounding nuclear energy—as a result of mostly negative news coverage, fictional treatments of nuclear-related issues, and such incidents as the accident at Three Mile Island—may intensify the zeal of some antinuclear activists to the point that they would be willing to commit

criminal antinuclear acts, especially if they perceived legal means of fighting nuclear development as failing.

Finally, widespread confusion and ignorance among the populace on the subjects of the utility of nuclear power installations and of their weaknesses, both real and imagined, must be regarded as an additional vulnerability of nuclear facilities. More than a few people, bewildered by the complexities of nuclear physics and technology—or, worse yet, by experts' diametrically conflicting views—may despair of being able to reach rational conclusions regarding nuclear issues and decide to cut the Gordian knot by favoring radical and aggressive negative action. They may be all the more inclined to do so if their fears are stimulated by further, equally hard-to-understand events such as the Three Mile Island accident.<sup>1</sup>

With regard to economically motivated crimes, nuclear theft appears to hold some potential attractions for professional criminals: the possibility of a very large monetary payoff (through sale, ransom back to the owners, or extortion); the psychological allure of excitement and challenge and the underworld reputation to be gained from such a grandiose Big Score; the possibility of securing immunity from prosecution during negotiations with the government; and the opportunity to wield power, at least temporarily, over society and government authorities.

However, strong countervailing deterrents to nuclear crime would also seem to be at work. Most criminals are not likely to have ways of contacting potential buyers for stolen nuclear commodities. They may have a healthy fear of exposure to radiation. They might not be able to count on protection from the criminal underworld. And the prospect of a massive government manhunt together with the virtual certainty of severe punishment if caught, adds to the many risks of what were uncharted criminal waters to begin with. In spite of it all, however, we cannot rule out the possibility that some few criminal minds would deem the payoff worth the risks. Experts agree that organized crime at least has sufficient resources to attempt nuclear theft. Whether they are likely to enter the nuclear domain remains a matter of speculation and debate.

To date, there is no evidence of a black market in nuclear material. It seems likely, therefore, that criminals would attempt to steal nuclear material only if commissioned by a buyer in advance (for example, the agent of a foreign government) or with the intent of ransoming the material back to its original owner.

New circumstances could change that picture, of course. The spread of nuclear energy programs, increased worldwide traffic in fissionable materials, and proliferation of nuclear weapons could widen the market for stolen nuclear material and cause professional criminals to reconsider their reluctance to deal in it. (The expanding market for narcotics in recent years, for example, has further spurred an already flourishing drug trade.) If a few daring criminals were willing to pioneer in nuclear crime—and if they were “successful”—this could lead to further nuclear crimes. As in the case of airline hijackings a few years ago, new crimes tend to beget

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<sup>1</sup>Science magazine takes its own ranks to task in this connection: “. . . the scientific community and the engineering professions have failed to help the other 98 percent of the population who are non-specialists to grasp the technical foundations of modern life and associated threats to survival. . . .” (Edward Wenk, Jr., *Science*, November 16, 1979.) It might be argued, however, that even if the scientific community had not been remiss in doing its best, its best might not have sufficed. It may simply be impossible to educate the public adequately, at the present time, with regard to the many aspects of nuclear power.

imitators. This would be particularly true if it became easier for criminals to find fences or other conduits for stolen material.

Psychotic people are another source of threat to nuclear programs. Virtually no type of action can be eliminated from the potential repertoire of acts considered by the functioning psychotic, that is, one who despite severe psychological disturbance is nonetheless capable of getting along in society and may be capable of planning a complex series of actions. Moreover, if operating within a delusional system, the psychotic adversary may feel completely justified in his actions (e.g., if celestial voices order him to carry them out). To the rational observer, the psychotic's actions or attempted actions are likely to appear bizarre.

Employees represent a special potential threat to nuclear programs because of their physical access to nuclear facilities and their special information and knowledge, which could enable them to exploit vulnerabilities in the system. Employees might be prompted to undertake hostile actions out of personal job frustrations; ideological disillusionment; economic self-interest; labor-related strife; a psychotic episode; or a variety of idiosyncratic reasons. Moreover, there is the danger of coercion of a loyal employee by outsiders, through threats of physical harm or blackmail, to cooperate in criminal acts against a nuclear facility. Depending on their motivation, employee crimes could range all the way from hoax bomb threats to theft of SNM to sabotage.

The more effective the security systems of nuclear facilities are rendered against outside penetration, the greater would be the need of outside adversaries to recruit insiders to cooperate in their criminal schemes. Thus, the insider issue would assume increasing importance for security considerations, and also for future research and analysis.

Professional criminals are unlikely to secure the more sensitive jobs in nuclear facilities, because most of them have criminal records that would be picked up during routine background investigations of applicants for such positions. The criminal with no record conceivably could slip through. And the amateur criminal or opportunist—the employee who will seize the chance to cash in on a fortuitous opportunity—probably cannot be identified in advance.

The multiplicity of possible crimes against nuclear programs presents a special challenge to those charged with defending against such actions. The wide range of threats calls for a wide-ranging defensive strategy. Protecting the perimeters of nuclear facilities against armed penetration from outside is obviously necessary but is far from sufficient. For example, defenders must also worry about hostile actions by insiders, and the possibility that seemingly stable employees will suffer psychotic breaks triggered by job-related pressures or other forces in their personal lives. Even the most sophisticated program of advance psychological screening of personnel is no guarantee against destructive acts by employees.

It is not our purpose here to make specific recommendations about security measures. The function of this report has been to identify the need for a comprehensive and coordinated defensive strategy, given the extensive motivational base for nuclear crime that we have described. The components of such a strategy would include mechanisms and procedures designed to (1) provide physical and psychological deterrents to nuclear-related crimes; (2) defeat at the outset any nuclear-related crime that is attempted; (3) respond effectively in the event of a nuclear-related incident that is not successfully defeated in its opening stages. Such a response

would necessarily require coordination of numerous governmental entities (e.g., local law enforcement, state and federal officials, military personnel) and effective handling of such complex issues as news media coverage and possible civilian evacuation.

For nuclear security officials to conceive of a defensive strategy in such far-reaching terms is an ambitious charge. However, the unique qualities of the domain of nuclear crime would appear to demand more than a "castles and moats" approach to the security of nuclear programs.





## Appendix

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